A Local Public Health Laboratory Response to the 2009 Influenza A H1N1 Pandemic: Mapping of Preparedness to Core Laboratory Functions and Essential Services

Steve Gradus, David Bina, Jose Navidad, Manieet Khubbar, Mark Zemke, and Sanjib Bhattacharvya - City of Milwaukee Public Health Laboratory, Milwaukee, Wisconsin

Background: The emergence of 2009 Influenza A H1N1 posed significant challenges to public health laboratories including the City of Milwaukee Public Health Laboratory. The dramatic surge in workload in our laboratory from 854 influenza specimens in 2008 to 5.707 in 2009 (568% in crease) with >25% positivity rate resulted in significantly modified operations during a major

Global flu pandemic imminent;

first likely cases found in state

City closes four schools; caution urged

Mapping of PH Laboratory Core Functions with Essential Services: The laboratory preparedness capa-

bilities for the 2009 Influenza A H1N1 pandemic were examined in the framework of their relationship to core functions when manned to the 10 Essential Services of Public Health, Laboratory activities included working with in-house investigators and external partners: local hospitals, research and public health laboratorie including CDC and WHO.

The key priority areas for the laboratory included timely diagnosis, detection and characterization of influenza strains result reporting, data sharing and messaging partners, public policy, workforce integrity, revenue generation and cont nuity of operations. Laboratory activities

supported decision making processes within the Incident Command Structure and influenced activities such as mass vaccination clinics and school closings.

Conclusions: The laboratory maintained overall services and operational integrity during the pandemic and supported the Essential Services required for the community at large. Laboratory re sponse to a major public health emergency can be framed and described for policy makers to show its contribution to the larger public health picture.

INTRODUCTION

The 11 Core Functions of Public Health Laboratories (CF)¹ describe the expected capabilities that the Public Health Laboratory System^{4,5} provide or assure in safeguarding the public's health. These 11 measureable Core Functions assure that the 10 Essential Services of Public Health (ES) are adequately supported by laboratory-based scientific data.

A cross-walk of Core Functions to Essential Services has been described⁶ and illustrates how

The goal of this poster is to show how measurable activities of the public health laboratory fulfill the Core Functions and support the Essential Services during a significant public health event, the 2009 Influenza A H1N1 outbreak



Pandemic 2009 H1N1 Outbreak Response

identify and solve commnity health problems

EMPOWER people about health issues

DEVELOP POLICIES and

ASSURE a competent public and personal health care

RESEARCH for new insights health problems

CONCLUSION

outhreak in Milwaukee

Many state as well as some local public health laboratories have striven to develop laboratory networks whose goal is to respond to public health needs and threats consisting of those who initiate test ing and those who ultimately use the test results. APHL defined these as State Public Health Laboratory Systems (SPHLS)4.5 Milwaukee's local PHLS is such a network within which Core Functions1 and Essential Services2 of PHI s takes place.

Role of the Laboratory Response Network

Over ten years of preparedness planning, and with support as a

member of the Laboratory Response Network (LRN), MHDL was

enabled to respond to many outbreaks and surges. This support

and planning assured a rapid response and continuity of operations for the Essential Services and Core Functions necessary to

meet the public health demands of the pandemic 2009 H1N1

The Essential Services provide a framework to describe and examine the breadth of public health practice, performance, and infrastruc ture capability needed within both the state and local public health

The laboratory response to pandemic 2009 Influenza A H1N1 in Milwaukee provides an illustration of Core Functions of Public Health Laboratories supporting these Essential Services within the network of a regional Public Health Laboratory System

Why is it important to link Core Function activities to the Essen-

These links provide insight and illustrate, document and justify the

- 1) community assessment of public health and public health
- 2) grant justification
- 3) accreditation of health agencies and laboratories
- suring the effectiveness of public health activities against na tional standards such as the Essential Services.

Therefore, linking activities of Core Functions to Essential Services shows that public health laboratories play a critical role in meeting

This poster illustrates how in a severe test of the public health system (2009 H1N1), the Public Health Laboratory System in Mil



Ten Essential Services of Public Health

MONITOR health status to

DIAGNOSE & INVESTIGATE health problems and health hazards in the

problems

ations that protect

accessibility, and quality

9 Developing antiviral

Pyrosequencing

Influenza serological study

and innovative solutions to

MHD Laboratories Provided Essential Services via Public Health Laboratory Core Functions

Lab surveillance annual 2 Flectronic Data sharing: WHO CDC. State Lab. Local Labs. Internal LIS key to response.

Sentinel test sites Laboratory testing H1N1 pandemic flu plan LRN dual-use planning key to response

Laboratory Data

· 42 Agencies served for

• 5.804 real-time PCR

• 1.663 pos (28.6%)

• 98.6% H1N1

Policy Development

(04/28/09 - 04/18/10)

. Respiratory Virus Panel:

93/501 detects: 9 viruses

· 449 HAI serological tests

panel surveillance 4 Fit testing & hand washing

3 PCR; serology, confirmatory

testing, antiviral resistance

WHO & state surveillance lab

Extended respiratory virus (17)

8 Expanded response: 2-county area, 42 agencies Departmental ICS Testing: Culture, PCR, serology,

· shift changes

· workload changes

· weekend work

· temporary staff

lah interns

Pertissing all insultry Data Management Specia Regulation Sulfrig & Statemer Management Statement Statemen

Case Wangamed Laboratoy Role Communication Visions & Montagement Wangament

· courier service

· cross-trained staff

· additional instrumentation

Allowed continuity of operations.

Operational surges

10 Educated first responders & academic partners Internal Lab-Epi: · Lab & demographic information

messaging: over 100

network recipients

Telephone/email

responses

• ICS requisition

research & reference lah · client messaging morbidity & lab data APHL - conference calls. 11 *e*LAB network

situational reports, policy CDC - assay validation &

confirmation; reagents, technical support; website for H1N1 & situational WHO - provided weekly

mutual surge capactiy

MidWest Regional Virus

Program (MRVP): flu

assistance

reagents & global situational undates

Local Partners: *e*LAB network - Messaging & MHDI website provided testing algorithms. educating partners of evolving test criteria &

decisions

vaccination clinics Lab staff on standby to assist flu vaccine clinic

workload & generate

Incident Command Structure

uninsured and advice to area labs One of three official

developing flu anti-viral resistance assays workforce Intra-sectional cross-training for flu

NA extraction

MHDL etaff by CDC

WSLH, APHL and area

surge: database access for · order entry · sample processing

Assisted local labs with test validation

Feedback resulted in

clarification of flu

feedback survey of lab Other respiratory virus RVP study Cluster of EV-68 detected

providers

· Mixed infections with pandemic influenza

Shared data with local research teams MHD co-authored publication of severity of nationwide outbreak MHD

The Severity of Pandemic H1N1 Influenza in the United States, from April to July 2009: A Bayesian Analysis

Lab contributed to this

information.

- 4) political and organizational accountability, which rely on mea-

the desired outcomes and goals of the Essential Services.

waukee contributed significantly toward achieving those goals

Inhorn, SI, Astles, RJ, Gradus, S, Malmberg, V, Snippes, PM, Wilcke, BW and White VA. Pub Hith Rep. 2010 Supplement 2, Vol. 125:4-17. The State Public Health Laboratory System.

Supporting Essential Services via Public Health Laboratory Core Functions

INFORM, EDUCATE, & MOBILIZE community

partnerships and actions to identify and solve health

PLANS that support individual and community health efforts

health and ensure safety

personal health services and assure the provision of health

EVALUATE effectiveness. of personal and population-based health services

3 CDC training and

6 Provided online

services

certification for flu

11 Wisconsin State Lab: 7 Impact on school closing 6 Assisted labs in 3 Provided testing for 10 Interns assisted in conference calls, electronic validating flu assays clinics serving data sharing, workload Policy & technical

confirmatory

southeastern

reference labs in

Fee exempt policy revised mid-outhreak to modulate

I ab participation in

protocols for both first & second waves

Public Health Laboratory Core Functions

1 Disease control prevention and surveillance 2 Integrated data management

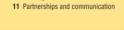
3 Reference and specialized testing

4 Environmental health and protection 5 Food safety (not applicable) 6 Laboratory improvement and regulation

8 Emergency response

9 Public health-related research 10 Training and education

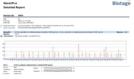
11 Partnerships and communication



Reference & Specialized Testing/Public Health-related Research May-Dec 2009 (n=499), 8% titers > 40 for 2009 FluAH1N1









MHD Influenza A (H1N1) Testino